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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE CROATAN NATIONAL FOREST, NORTH CAROLINA

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ABSTRACT

Southern pine beetle (*Dendroctonus frontalis*) infestations were detected on the Croatan National Forest. An aerial survey of 308,226 acres combined with ground checks shows about 44 spots concentrated in the western part of the forest. Infestation severity does not justify a specially funded control project at this time, but the area should be resurveyed in the early summer of 1980.

INTRODUCTION

A biological evaluation was made on the Croatan National Forest to determine the status of southern pine beetle infestations and possible need for suppression measures.

Historically, the Croatan National Forest has experienced little serious southern pine beetle activity. In the past, southern pine beetle outbreaks have occurred, but a sustained outbreak has never occurred. Outbreaks usually occur periodically and then die out without considerable losses.

METHODS

A standard aerial sketch map survey (50%) was made by personnel of the Aerial Survey Team, Forest Insect and Disease Management, Doraville, Georgia. The survey was made on September 12, 1979. Locations of dead and dying trees were marked on a class A Forest Service map which was forwarded to the Asheville Field Office. In Asheville, spots were stratified by size class and 10 random spot selections for ground checking were made proportionate to size class distributions.

Data collected at each infestation included the number of currently infested trees and numbers of red and green trees. Collection of bark samples was planned to determine attack-emergence ratios (an accepted indicator of individual infestation vitality) however, in all cases, bark had deteriorated so badly that it was unreadable.

RESULTS

Table 1 shows results of the aerial survey by spot size. Figure 1 shows areas where ground checking confirmed southern pine beetle activity to be concentrated.

Table 2 shows ground truth data including number of trees by spot size, and mean number of actively infested trees per spot by size class.

Table 3 includes additional miscellaneous information.

Table 1.--Spot size distribution on Croatan National Forest--Expanded aerial survey data.

----- Number of spots by size class -----				
<u>2-5</u>	<u>6-20</u>	<u>21-50</u>	<u>50+</u>	<u>Total</u>
18	20	6	0	44

Table 2.--Numbers of sampled spots and trees by size class category,
Croatan National Forest.

----- Spot size class category -----									
2-5		6-20		21-50		50+		Totals	
Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees
3	6	5	44	3	131	0	0	11	169
Infested									
trees/spot		1		8		27		0	
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Table 3.--Miscellaneous information, Croatan National Forest Southern Pine
Beetle Evaluation, 1979.

Percent of sample spots with currently infested trees: 70

Estimated number of infestations/1000 acres host type: .42

Estimated \bar{x} number of currently infested trees/spot: 12

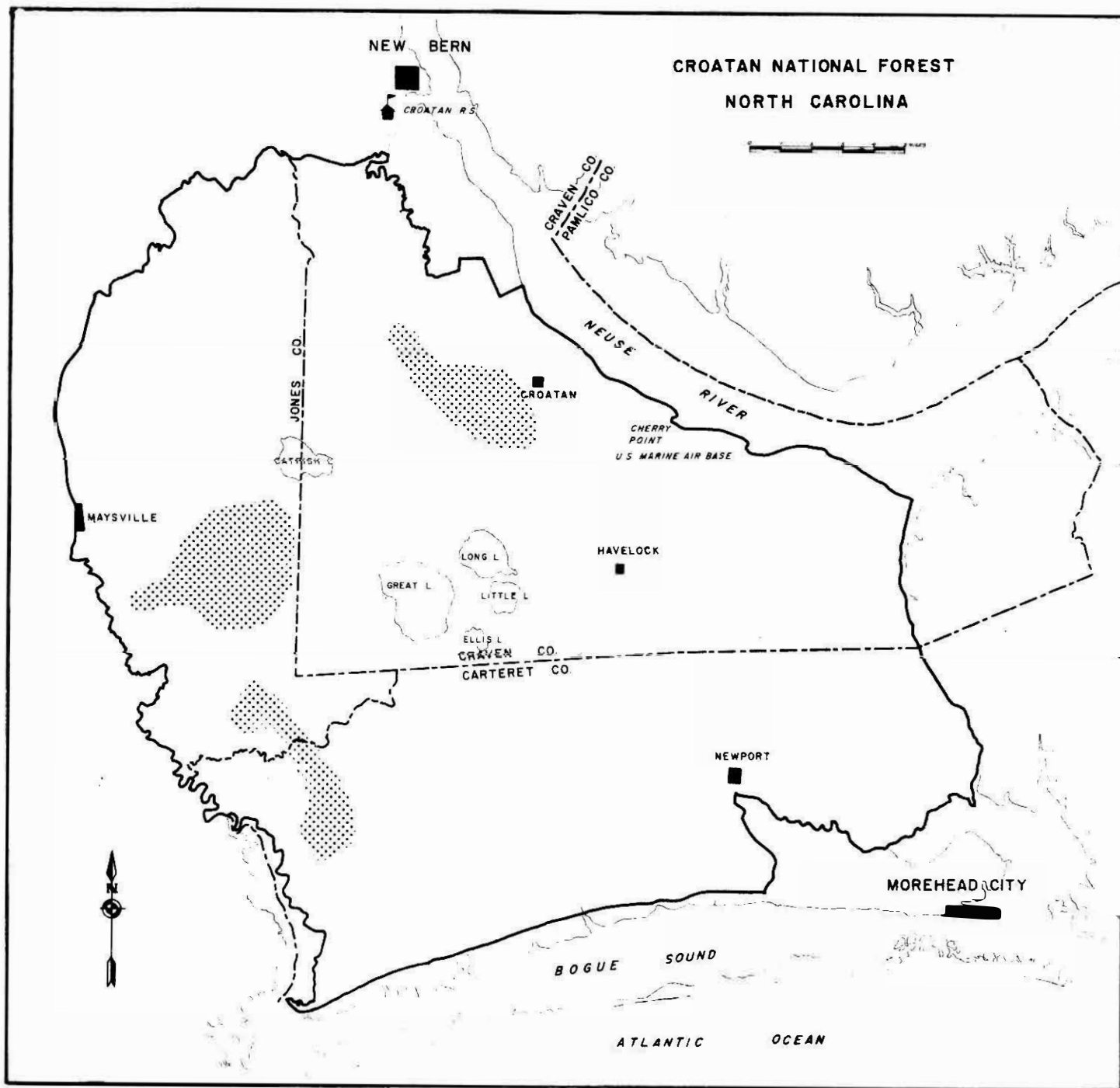


Figure 1. -- Areas where southern pine beetle activity is concentrated.

DISCUSSION AND RECOMMENDATIONS

The data indicate that southern pine beetle populations are currently low, however, the number of currently infested trees in spots containing over five trees indicates a significant potential for buildup in the spring and summer of 1980. It is recommended that the Croatan National Forest be again evaluated in the early summer of 1980.

Infestation severity is currently not high enough to recommend a specially funded control project, but controls should nonetheless be carried out on a normal operating basis. Depending on individual spot situations, any one of four control techniques may be used:

1. Removal of Infested Trees by Commercial Sale or Administrative Use.

When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

When practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

- Trees in the buffer zone at the head(s) of the spot - if not removed within 2 weeks of marking, another visit and tally must be made in order to insure removal of all infested trees and an adequate buffer strip.
- Trees with fresh attacks and having young broods (usually the green, recently infested trees).
- Trees having nearly developed broods (usually the red and fading trees).

Remove infested trees from National Forest lands by commercial sale or administrative procedure in accordance with guidelines and procedures set forth in FSM 2400 through 2490.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly

burned to insure effective control. The side order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph 1 under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a $\frac{1}{2}$ percent lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts No. 2 diesel fuel.)

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of runoff. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Low pressure sprayers may be used to treat large accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph 1 under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetle have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in Section 8.3 of the Forest Service Health and Safety Code FSM 5242.21.

4. Cut-and-leave. This control tactic reduced losses from spot growth and proliferation during the summer months. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (40 active trees) by dispersing emerging beetles. These spots can be salvaged when markets or weather permit. Trees are still suitable for sale months after felling.

The following procedure is to be followed when cut-and-leave is used:

- (1) Identify all active trees within the spot.
- (2) Fell all active trees toward the center of the spot.
- (3) Fell a horseshoe-shaped buffer of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be as wide as the average height of the trees in the stand.

Cut-and-leave treatments should only be applied during the summer months between June and October. Spots with 10 or more infested trees should be treated first. As time permits, spots with 10 infested trees should also be treated if they contain trees with recent, fresh attacks. In these smaller infestations where a specific head is not distinguishable, an adequate buffer strip (equivalent to the average height of the stand) and all infested and green uninfested trees within the spot should be felled.

Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated or cut and left within 2 or 3 weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

In any area where infested trees are cut for chemical control or piling and burning or removed through commercial sales and administrative use procedures, stumps adjacent to living pine trees should be treated to control or prevent the root rot Fomes annosus.

Stands that have been previously thinned or have had a history of F. annosus infection, stumps should be treated with the competing fungus, Peniophora gigantea.

Southern pine beetle infested tree stumps cut during the period of May through August, and below 34° N. latitude do not have to be treated. This is because few spores are formed during this period and high temperatures often kill spores that are produced. However, routine summer thinning in areas of southern pine beetle buildup is not recommended (Froelich, R. C., et al., 1977).

The preceding techniques represent only short-term, immediate control strategies. In the long term, preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

- (a) Preventing or minimizing littleleaf disease, a condition which predisposes these weakened trees to beetle attack. Depending on severity of infection, diseased trees may be removed during normal thinnings, on a 6-year cutting cycle or as soon as merchantable. In high-hazard areas or in replanting known littleleaf sites, use loblolly pine or a more resistant tree species, as opposed to shortleaf pine.
- (b) Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible.
- (c) Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. They should be thinned to a point that trees again show thrift and vigor.
- (d) Minimizing impact of natural disturbances which cause stand stress. These factors include ice, wind, hail, and animal damage, flooding, erosion, poor soil fertility, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

- (e) Minimizing or eliminating man-caused disturbances. Logging, pipeline, sewerline, and powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction, and significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

All forest personnel should be informed of the problem and instructed to maintain constant surveillance for southern pine beetle activity. All sightings should be reported to the control project foreman.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment, if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.